IN THE CLAIMS:

Please replace the existing set of Claims with the following set, in which Claims 1, 8, 14 and 16 have been amended.

1. (Currently Amended). A waveguide optical mode transformer, comprising:

a core formed of a single material on a planar substrate structure, ~~said~~the core having first and second ends, a top surface, side surfaces, and a flat, planar bottom surface, the flat, planar bottom surface being disposed adjacent the planar substrate structure; and

a predetermined plurality of steps formed into the top surface of the core so as to vertically taper the core between the first and second ends, each step having a predetermined height and a predetermined length~~, said core having side surfaces and~~;

wherein the side surfaces ~~being smooth~~comprise a flat surface from the first end of the core to the second end of the core to create a single, uniform, horizontal taper between the first and second ends.

2. Cancelled.

3. (Previously Amended). The waveguide optical mode transformer of claim 1, wherein the vertical and horizontal tapers narrow at the same end of the core.

4. (Original). The waveguide optical mode transformer of claim 1, further comprising a dielectric cladding layer formed over the core.

5. (Original). The waveguide optical mode transformer of claim 1, wherein the planar substrate structure includes a dielectric layer formed over a semiconductor substrate.

6. (Original). The waveguide optical mode transformer of claim 1, wherein the core is crystalline silicon.

7. (Original). The waveguide optical mode transformer of claim 1, further comprising dielectric layers formed under and over the core, wherein the dielectric layers each have a refractive index that is lower than the refractive index of the core.

8. (Currently Amended). An optical system, comprising:

a planar waveguide; and

a tapered waveguide extension formed at an end of the planar waveguide for coupling light between the planar waveguide and an optical fiber, the waveguide extension having a core formed of a single material on a planar substrate structure, ~~said~~the core having first and second ends, a top surface, side surfaces and a flat, planar bottom surface opposite ~~said~~the top surface and positioned adjacent ~~said~~the planar substrate structure, a predetermined plurality of steps formed into the top surface by dry etching the waveguide extension so as to vertically taper ~~said~~the waveguide extension

between the first and second ends, each of the steps having predetermined height and length and being formed such that an edge of each step is parallel to the first and second ends of the core, and the side surfaces ~~being smooth~~each comprising a flat surface from the first end of the waveguide extension to a second end of the waveguide extension to create a single, uniform, horizontal taper.

9. (Canceled).

10. (Original). The optical system of claim 8, wherein the tapered waveguide extension includes a crystalline silicon core.

11. (Original). The optical system of claim 10, wherein the tapered waveguide extension includes a dielectric cladding layer formed over the core.

12. (Original). The optical system of claim 8, wherein the tapered waveguide extension includes a core layer between two dielectric layers, wherein the dielectric layers each have a refractive index that is lower than the refractive index of the core.

13. (Original). The optical system of claim 8, further comprising the optical fiber.

14. (Currently Amended). A method of manufacturing a tapered planar waveguide usable as an optical mode transformer between an optical fiber and a planar waveguide, comprising:

(a) providing a planar substrate ~~material,~~material;

(b) forming a core layer of core material for the tapered waveguide on the planar substrate material, ~~said~~the core layer having first and second ends, a top surface, and a flat, planar bottom surface opposite ~~said~~the top surface;

(c) forming ~~said~~the first and second ends of the core layer so that the first end is wider than the second end;

(d) forming sidewalls of ~~said~~the core layer so that they are ~~smooth~~flat and extend between ~~said~~the first end and said second end to create a single, uniform, horizontal taper between ~~said~~the ends;

(e) applying a protective layer over a predetermined area of the core layer extending from the first end towards the second end to define a protected area and leaving an unprotected area on ~~said~~the core layer;

(f) dry etching the unprotected area of the core layer to a predetermined depth defining a step having a height without etching through ~~said~~the single core material wherein an edge of the step is parallel to the first and second ends of the core layer; and

(g) repeating steps (e) and (f) a predetermined number of times, each time extending the protected area farther from the first end to define a length of a new step so as to form a predetermined number of steps in the top surface of the core layer

so as to vertically taper said core layer, each step having a predetermined height and a predetermined length.

15. (Canceled).

16. (Currently Amended). The method of claim 14, wherein the step of providing ~~said~~the substrate further includes: providing ~~said~~the substrate with a dielectric layer formed on the substrate, and the core layer of core material being formed on the dielectric layer.

17-8. (Canceled).

19. (Original). The method of claim 14, further comprising polishing the wider end of the tapered waveguide.

20. (Original). The method of claim 14, further comprising applying an anti-reflective coating at the wider end of the tapered waveguide.